

From these observations, and from the peculiar provision of fat laid up by the tadpole previous to its metamorphosis into the frog, Sir Everard Home is led to consider a certain portion of oil as necessary for the formation of bone, and to observe that the proportion of fat in different ova, corresponds with the greater or less degree of hardness of bone that is about to be produced.

*On the Structure of the Crystalline Lens in Fishes and Quadrupeds, as ascertained by its Action on Polarized Light.* By David Brewster, LL.D. F.R.S. Lond. and Edin. In a Letter addressed to the Right Hon. Sir Joseph Banks, Bart. G.C.B. P.R.S. Read June 20, 1816. [*Phil. Trans.* 1816, p. 311.]

The author having found that in many instances depolarization depends upon variations of density in the bodies through which it is transmitted, concluded that corresponding effects would be produced by the crystalline lens of the eye, which is well known to increase in density towards the centre.

By immersing the crystalline lens of a cod in Canada balsam, the refraction at its exterior surface was so far removed, that the effects of its internal texture could be examined independent of its external spherical form. Under these circumstances, when it was exposed to polarized light, with its axis of vision parallel to the beam of light, it exhibited three concentric circles of light separated by two dark circles, and intersected by a black cross so as to be divided into twelve luminous sectors. By varying the inclination of the axis, these appearances varied in a manner that can scarcely be described without the assistance of the drawings which accompany this paper.

By removing successively the capsule and outer portions of the lens, the exterior circle of light was first obliterated; and then the second disappeared, so that ultimately there remained only the central light intersected by a black cross.

On examination of the variation of tints of colours produced by the combined effect of the crystalline with a plate of sulphate of lime, it appeared to the author that the central nucleus, and an exterior spherical coat, are in a state of dilation, while the intermediate coats are in a state of contraction.

In the crystallines of sheep and oxen, the author observed a correspondent texture; but in these there appeared only one series of luminous sectors.

By examination of the cornea also, Dr. Brewster found a texture similar to that of the nucleus of the crystalline, both in fish and quadrupeds; but the sclerotic coat has merely a confused power of depolarization, similar to that of a mass of crushed jelly of isinglass, a property which does not really belong to its whole substance, but solely to a thin membrane that covers it externally.

From these experiments Dr. Brewster infers, that all the parts of the crystalline of fishes correspondent to the two dark concentric circles, exercise no action upon polarized light; that a central nu-

cleus and an external spherical shell are in a state of dilatation, and that a shell intermediate between them is in a state of contraction; that its structure and optical properties are not alike in all directions, but have reference to the axis of vision; and that its peculiar structure probably is necessary for correcting spherical aberration.

*Some farther Account of the Fossil Remains of an Animal, of which a Description was given to the Society in 1814. By Sir Everard Home, Bart. V.P.R.S. Read June 13, 1816. [Phil. Trans. 1816, p. 318.]*

The present descriptions are taken from specimens in the collection of Mr. Buckland of Oxford, and Mr. Johnson of Bristol, and are thought to determine the class to which this animal belongs.

The structure of the vertebræ, as shown in the author's former paper, made it evident that the progressive motion of the animal resembled that of fishes; but at that time neither the scapula in its perfect state had been seen, nor had the bones of the pectoral fin been found, which now make it clear that all the bones correspond with those of fishes, but differ essentially from those of land animals.

In all animals that breathe by means of lungs, the ribs are articulated both to the bodies and to the transverse processes of the vertebræ, so as to admit of expansion of the chest; but the ribs of fishes which solely give defence to the viscera, have only one insertion, being connected solely with the bodies of the vertebræ, midway between their two articulating surfaces, so as not to interfere with the motion of the vertebræ on each other, as is the case in land animals.

The author observes, that the ribs in this animal are placed in all respects like those of fish.

In the whale tribe the scapula and bones of the fore fin resemble those of the crocodile, and they bear a close analogy to those of land animals in general; but in this animal these bones, it is observed, resemble those of the shark.

It is remarked also, that the bones in the young state have epiphyses, as is the case with the bones of fish generally. The ribs also appear to have been soft like those of fish, as we may judge from the grooved or fluted form, they have assumed by compression.

But though, from consideration of all these circumstances, Sir Everard Home has no doubt that this animal was a fish, he admits that the long projecting snout and conical teeth show a marked difference between this animal and any now in existence, and may occasion a difficulty in arranging it with any class of known animals.

*Farther Observations on the Feet of Animals whose progressive Motion can be carried on against Gravity. By Sir Everard Home, Bart. V.P.R.S. Read June 27, 1816. [Phil. Trans. 1816, p. 322.]*

Since the author's former observations on this subject were communicated to the Society, he has been enabled, by the assistance of